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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/692,754	10/27/2003	Hau-Wei Wang	WANG3205/EM	8890
23364	7590	01/11/2005	EXAMINER	
BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			AMARI, ALESSANDRO V	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/692,754

Applicant(s)

WANG ET AL.

Examiner

Alessandro V. Amari

Art Unit

2872

– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-14 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the diffractive optical element having a ladder shape as recited in claim 3 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 4-9, 11, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vo-Dinh US 6,174,677 in view of Caudle et al US 6,816,316.

In regard to claim 1, Vo-Dinh teaches (see Figure 18) a microscopic imaging apparatus comprising an incident light source (75) for providing an incident light; a beam-splitter (105) for reflecting said incident light onto at least one target sample and further exciting said target sample to emit a light with optical signals passing through said beam-splitter; and an image sensor (130) for receiving said light with optical signals passing through said beam-splitter to obtain at least one detected image of said sample as described in column 25, lines 45-67 and column 26, lines 1-6.

However, in regard to claim 1, Vo-Dinh does not teach a diffractive optical element for receiving said incident light and generating a uniform incident light or regarding claim 4, that the intensity of said incident light is a Gaussian distribution, and the incident light is transformed to a light having an intensity of flat top distribution by passing through said diffractive optical element or regarding claim 9, that the diffractive optical element only allows the light with a wavelength in a range of visible light or infrared rays to pass through said diffractive optical element.

In regard to claim 1, Caudle et al teaches (see Figure 2) a diffractive optical element (34) for receiving said incident light and generating a uniform incident light (44) as shown in Figure 2.

Regarding claim 4, Caudle et al teaches that the intensity of said incident light is a Gaussian distribution (32), and the incident light is transformed to a light having an intensity of flat top distribution (44) by passing through said diffractive optical element as shown in Figure 2.

Regarding claim 9, Caudle et al teaches that the diffractive optical element only allows the light with a wavelength in a range of visible light or infrared rays to pass through said diffractive optical element as described in column 7, lines 21-39. Although the prior art does not specifically disclose the claimed wavelength range, this is seen to be an inherent teaching of this device since it is apparent that the device must operate in the visible wavelength range for the device to function as intended.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the diffractive optical element of Caudle et al in the microscopic imaging apparatus of Vo-Dinh in order to improve the beam diameter so as to minimize undesired intensity variations.

Regarding claim 5, Vo-Dinh teaches (see Figure 18) a tunable filter (125) disposed between said beam splitter and said image sensor as described in column 25, lines 45-67 and column 26, lines 1-6.

Regarding claim 6, Vo-Dinh further teaches that said tunable filter is a liquid crystal tunable filter (LCTF) or an acoustic-optic tunable filter (AOTF) as described in column 25, lines 45-62.

Regarding claim 7, Vo-Dinh further teaches (see Figure 18) a beam expander (85) disposed between said diffractive optical element and said beam splitter.

Regarding claim 8, Vo-Dinh teaches (see Figure 18) an objective lens (100) located between the beam splitter and said sample.

Regarding claim 11, Vo-Dinh teaches (see Figure 18) an optical filter (110) disposed between said beam splitter and said tunable filter.

Regarding claim 12, Vo-Dinh teaches that the optical filter is a high pass filter as described in column 25, lines 45-67 and column 26, lines 1-6.

Regarding claim 14, Vo-Dinh teaches that the image sensor is a charge coupled device as described in column 26, lines 1-6.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vo-Dinh US 6,174,677 in view of Caudle et al US 6,816,316.

Regarding claim 10, Vo-Dinh in view of Caudle et al teaches the invention as set forth above but does not teach that said diffractive optical element (doe) is made of quartz, polymethyl methacrylate or silicon. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make a diffractive optical element of quartz, polymethyl methacrylate or silicon, since it has been held to be within the ordinary skill of a worker in the art to select a known material on the basis of its suitability for the intended use. One would have been motivated to utilize the claimed

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materials for the manufacture of the doe for the purpose of making a rigid and durable diffractive optical element. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945)

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vo-Dinh US 6,174,677 in view of Caudle et al US 6,816,316 and further in view of Bergstein et al US 6,633,433.

Regarding claim 3, Vo-Dinh in view of Caudle et al teaches the invention as set forth above but does not teach that said diffractive optical element has a ladder shape.

Regarding claim 3, Bergstein et al does teach a diffractive optical element having a ladder shape as shown in Figures 6, 8 and 9.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the optical element of Bergstein et al in the microscopic imaging apparatus of Vo-Dinh in view of Caudle et al in order to improve the power transmitted through the diffractive optical element thus reducing edge effects or high spatial frequency noise.

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vo-Dinh US 6,174,677 in view of Caudle et al US 6,816,316 and further in view of Hoyt et al US 5,943,129.

Regarding claim 13, Vo-Dinh in view of Caudle et al teaches the invention as set forth above but does not teach an imaging lens mounted between said tunable filter and said image sensor.

Regarding claim 13, Hoyt et al teaches (see Figure 5) an imaging lens (23) mounted between said tunable filter and said image sensor as described in column 5, lines 16-53.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the imaging lens of Hoyt et al in the apparatus of Vo-Dinh in view of Caudle et al in order to improve collection of emissions from the sample thus forming a brighter image on the image sensor.

***Allowable Subject Matter***

7. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claim 2 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "said diffractive element has a smooth and continuous surface, and the thickness at the center of the diffractive optical element is less than that of the edges" as set forth in the claimed combination.

The prior art of record, Vo-Dinh in view of Caudle et al teaches a microscopic imaging apparatus comprising an incident light source, a diffractive optical element for generating a uniform incident light, a beam splitter and an image sensor but does not teach that the diffractive element has a smooth and continuous surface, and the thickness at the center of the diffractive optical element is less than that of the edges and there is no motivation or teaching to modify this difference as derived.



***Conclusion***

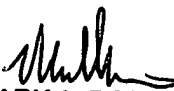
9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tawa et al US 6,201,229 teaches an optical element which takes incident light with a Gaussian distribution and converts the light to an intensity of flat top distribution as shown in Figure 1.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ava 014  
06 January 2005

  
MARK A. ROBINSON  
PRIMARY EXAMINER